This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-20 (cancelled)

Claim 21. (currently amended) A process for growing a single crystal silicon ingot in which the ingot comprises a central axis, a seed-cone, an end-cone and a constant diameter portion between the seed-cone and the end-cone having a circumferential edge and a radius extending from the central axis to the circumferential edge and a nominal diameter of about 200 mm, the ingot being grown and cooled from the solidification temperature in accordance with the Czochralski method, the process comprising:

bringing a seed crystal into contact with a silicon melt;

pulling the seed crystal from the melt at a pulling rate, such that silicon solidifies on the seed crystal thereby forming a single crystal silicon ingot, wherein the pulling rate after at least about 200 mm of the axial length of the ingot has formed is from about 0.2 mm/min to about 0.8 mm/min; and,

controlling (i) a growth velocity, v, (ii) an average axial temperature gradient, G_0, during the growth of the constant diameter portion of the crystal over the temperature range from solidification to a temperature of no less than about 1325 °C, and (iii) the cooling rate of the crystal from the solidification temperature to about 1,050 °C to cause the formation of an axially symmetric~~al segment which is substantially free of~~ **region having no detectable** agglomerated intrinsic point defects **at a detection limit of 10^3 defects/cm^3,** wherein the axially symmetric region has a radial width which is at least about 30% of the length of the radius of the constant diameter portion of the ingot, and has a length as measured along the central axis of at least about 20% of the length of the constant diameter portion of the ingot.

Claim 22. (previously presented) The process of claim 21 wherein the pulling rate after at least about 200 mm of the axial length of the ingot has formed is from about 0.25 mm/min to about 0.6 mm/min.

Claim 23. (previously presented) The process of claim 21 wherein the pulling rate after at least about 200 mm of the axial length of the ingot has formed is from about 0.3 mm/min to about 0.5 mm/min.

Claim 24. (previously presented) The process of claim 21 wherein the control of G_0 comprises controlling heat transfer at the melt/solid interface.

Claim 25. (previously presented) The process of claim 24 wherein heat transfer at the melt/solid interface is controlled by changing the distance between the melt surface and a device positioned above the melt surface.

Claim 26. (previously presented) The process of claim 25 wherein the device is selected from the group consisting of a reflector, a radiation shield, a heat shield, an insulating ring, a purge tube or a light pipe.

Claim 27. (previously presented) The process of claim 25 wherein heat transfer is controlled by changing the position of the melt surface relative to the position of the device.

Claim 28. (previously presented) The process of claim 25 wherein heat transfer is controlled by changing the position of the device relative to the position of the melt surface.

Claim 29. (previously presented) The process of claim 24 wherein heat transfer at the melt/solid interface is controlled by adjusting power supplied to a heater near the silicon melt.

Claim 30. (previously presented) The process of claim 21 wherein the crystal has a nominal diameter of about 200 mm and is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 10 hours.

Claim 31. (previously presented) The process of claim 21 wherein the crystal has a nominal diameter of about 200 mm and is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 20 hours.

Claim 32. (previously presented) The process of claim 21 wherein the length of the axially symmetric region is at least about 40% of the length of the constant diameter portion of the ingot.

Claim 33. (previously presented) The process of claim 21 wherein the length of the axially symmetric region is at least about 60% of the length of the constant diameter portion of the ingot.

Claim 34. (previously presented) The process of claim 21 wherein the width of the axially symmetric region is at least about 60% of the length of the radius of the constant diameter portion of the ingot.

Claim 35. (previously presented) The process of claim 21 wherein the growth velocity, v, and the ~~**instantaneous**~~ **average** axial temperature gradient, G_0, are controlled such that the ratio, v/G_0, ranges in value from about 0.6 to about 1.5 times the critical value of v/G_0.

Claim 36. (previously presented) The process of claim 21 wherein the growth velocity, v, and the ~~**instantaneous**~~ **average** axial temperature gradient, G_0, are controlled such that the ratio v/G_0 ranges in value from about 0.75 to about 1 times the critical value of v/G_0.

Claim 37. (previously presented) The process of claim 21, wherein the cooling rate is controlled to achieve radial diffusion of self-interstitial intrinsic point defects over a distance of at least about 5 cm.

Claim 38. (previously presented) The process of claim 21 wherein the cooling rate is controlled to achieve radial diffusion of self-interstitial intrinsic point defects over a distance of at least about 10 cm.

Claim 39. (currently amended) The process of claim 21 further comprising rapidly cooling the ingot through a range of temperatures in which oxygen precipitate nucleation centers typically form such that oxygen precipitate nucleation centers do not form in the **ingot** during the cooling of the ingot.

Claim 40. (previously presented) The process of claim 39 wherein the range of temperatures in which oxygen precipitate nucleation centers form is from about 350 °C to about 750 °C.

Claim 41. (new) A single crystal silicon wafer having a central axis, a front side and a back side which are generally perpendicular to the axis, a circumferential edge, and a radius extending from the central axis to the circumferential edge of the wafer, the wafer comprising:

a nominal diameter of about 300 mm;

an axially symmetric region having no detectible agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3, the axially symmetric region extending radially inwardly from the circumferential edge of the wafer and having a width, as measured from the circumferential edge radially toward the center axis, which is at least about 40% the length of the radius of the wafer.

Claim 42. (new) The wafer as set forth in claim 41 wherein the axially symmetric region is generally annular in shape and the wafer further comprises a generally cylindrical region wherein the cylindrical region is located radially inward of the axially symmetric region and the cylindrical region has crystal lattice vacancies as the predominant intrinsic point defect.

Claim 43. (new) The wafer as set forth in claim 41 wherein the wafer has as oxygen content which is less than about 13 PPMA.

Claim 44. (new) The wafer as set forth in claim 41 wherein the wafer has as oxygen content which is less than about 11 PPMA.

Claim 45. (new) The wafer as set forth in claim 41 wherein the wafer has an absence of oxygen precipitate nucleation centers.

Claim 46. (new) The wafer as set forth in claim 41 wherein the axially symmetric region extending radially inwardly from the circumferential edge of the wafer has a width, as measured from the circumferential edge radially toward the center axis, which is about equal to the length of the radius.

Claim 47. (new) The wafer as set forth in claim 41 wherein the axially symmetric region extending radially inwardly from the circumferential edge of the wafer has a width, as measured from the circumferential edge radially toward the center axis, which is at least about 30% the length of the radius, wherein silicon self-interstitials are the predominant intrinsic point defect in the axially symmetric region.

Claim 48. (new) A single crystal silicon ingot having a central axis, a seed-cone, an end-cone, and a constant diameter portion between the seed-cone and the end-cone having a circumferential edge and a radius extending from the central axis to the circumferential edge, and a nominal diameter of 300 mm, the single crystal silicon ingot being characterized in that, after the ingot is grown and cooled from the solidification temperature, the constant diameter portion contains an axially symmetric region having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3, wherein the axially symmetric region extends radially inwardly from a circumferential edge of the ingot, has a width as measured from the circumferential edge radially toward the central axis of the ingot which is at least about 30% the length of the radius of the constant diameter portion, and has a length as measured along the central axis of at least about 20% the length of the constant diameter portion of the ingot.

Claim 49. (new) The single crystal silicon ingot as set forth in claim 48 wherein the length of the axially symmetric region is at least 40% the length of the constant diameter portion of the ingot.

Claim 50. (new) The single crystal silicon ingot as set forth in claim 49 wherein the length of the axially symmetric region is at least 60% the length of the constant diameter portion of the ingot.

Claim 51. (new) The single crystal silicon ingot as set forth in claim 48 wherein the axially symmetric region has a width which is at least about 60% the length of the radius of the constant diameter portion.

Claim 52. (new) The single crystal silicon ingot as set forth in claim 51 wherein the axially symmetric region has a width which is at least about 80% the length of the radius of the constant diameter portion.

Claim 53. (new) The single crystal silicon ingot as set forth in claim 48 wherein silicon self-interstitials are the predominant intrinsic point defect in the axially symmetric region.

Claim 54. (new) A process for growing a single crystal silicon ingot in which the ingot comprises a central axis, a seed-cone, an end-cone and a constant diameter portion between the seed-cone and the end-cone having a circumferential edge, a radius extending from the central axis to the circumferential edge, and a nominal diameter of 300 mm, the ingot being grown from a silicon melt and then cooled from the solidification temperature in accordance with the Czochralski method, the process comprising:

controlling (i) a growth velocity, v, (ii) an average axial temperature gradient, G_0, during the growth of the constant diameter portion of the crystal over the temperature range from solidification to a temperature of no less than about 1325 °C, and (iii) the cooling rate of the crystal from the solidification temperature to about 1,050 °C to cause the formation of an axially symmetric region having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3 wherein the axially symmetric region extends inwardly from the circumferential edge of the ingot, has a width as measured from the circumferential edge radially toward the central axis of the ingot which is at least about three-tenths the length of the radius of the ingot, and has a length as measured along the central axis of at least about two-tenths the length of the constant diameter portion of the ingot.

Claim 55. (new) The process of claim 54 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 65 hours.

Claim 56. (new) The process of claim 54 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 75 hours.

Claim 57. (new) The process of claim 54 wherein the length of the axially symmetric region is at least about four-tenths the length of the constant diameter portion of the ingot.

Claim 58. (new) The process of claim 57 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 65 hours.

Claim 59. (new) The process of claim 57 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 75 hours.

Claim 60. (new) The process of claim 54 wherein the growth velocity, v, and the average axial temperature gradient, G_0, are controlled such that the ratio, v/G_0, ranges in value from about 0.6 to about 1.5 times the critical value of v/G_0.

Claim 61. (new) The process of claim 54 wherein the growth velocity, v, and the average axial temperature gradient, G_0, are controlled such that the ratio v/G_0 ranges in value from about 0.75 to about 1 times the critical value of v/G_0.

Claim 62. (new) The process of claim 54 wherein the average axial temperature gradient, G_0, is controlled over the temperature range from solidification to a temperature of no less than about 1350 °C.

Claim 63. (new) The process of claim 62 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 65 hours.

Claim 64. (new) The process of claim 62 wherein the crystal is cooled from the solidification temperature to a temperature of at least about 1,050 °C over a period of at least about 75 hours.

Claim 65. (new) The process of claim 54 wherein the control of G_0 comprises controlling heat transfer at the melt/solid interface.

Claim 66. (new) The process of claim 65 wherein heat transfer at the melt/solid interface is controlled by changing the distance between the melt surface and a device positioned above the melt surface.

Claim 67. (new) The process of claim 66 wherein the device is selected from the group consisting of a reflector, a radiation shield, a heat shield, an insulating ring, a purge tube or a light pipe.

Claim 68. (new) The process of claim 66 wherein heat transfer is controlled by changing the position of the melt surface relative to the position of the device.

Claim 69. (new) The process of claim 66 wherein heat transfer is controlled by changing the position of the device relative to the position of the melt surface.

Claim 70. (new) The process of claim 65 wherein heat transfer at the melt/solid interface is controlled by adjusting power supplied to a heater near the silicon melt.

Claim 71. (new) The process of claim 65 wherein the cooling rate is controlled to achieve radial diffusion of self-interstitial intrinsic point defects over a distance of at least about 5 cm.

Claim 72. (new) The process of claim 65 wherein the cooling rate is controlled to achieve radial diffusion of self-interstitial intrinsic point defects over a distance of at least about 10 cm.

Claim 73. (new) An epitaxial wafer, comprising a single crystal silicon substrate having a central axis, a front side and a back side which are generally perpendicular to the central axis, a circumferential edge, a radius extending from the central axis to the circumferential edge, and a nominal diameter of 300 mm, the substrate comprising an axially symmetric region having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3, the axially symmetric region extending radially inwardly from the circumferential edge has a width, as measured from the circumferential edge radially toward the center axis, which is at least about 30% the length of the radius, wherein silicon self-interstitials are the predominant intrinsic point defect in the axially symmetric region of the wafer, and an epitaxial layer which is deposited on the front side of the substrate.

Claim 74. (new) The epitaxial wafer as set forth in claim 73 wherein the width of the axially symmetric region is at least about 40% the length of the radius.

Claim 75. (new) The epitaxial wafer as set forth in claim 73 wherein the width of the axially symmetric region is at least about 60% the length of the radius.

Claim 76. (new) The epitaxial wafer as set forth in claim 73 wherein the width of the axially symmetric region is at least about 80% the length of the radius.

Claim 77. (new) The epitaxial wafer as set forth in claim 73 wherein the width of the axially symmetric region is about equal to the length of the radius.

Claim 78. (new) A process for producing an epitaxial wafer, the process comprising:

growing a single crystal silicon ingot having a central axis, a seed-cone, an end-cone, a constant diameter portion between the seed-cone and the end-cone having a circumferential edge, a radius extending from the central axis to the circumferential edge of the ingot, and a nominal diameter of 300 mm, and as part of the growth process controlling a growth velocity, v, and an average axial temperature gradient, G_0, of the crystal during the growth of the constant diameter portion of the ingot over the temperature range from solidification to a temperature of no less than about 1300 °C, to cause the formation of an axially symmetric region, upon cooling of the ingot from the solidification temperature, having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3, wherein the axially symmetric region of the ingot extends inwardly from the circumferential edge of the ingot, has a width as measured from the circumferential edge of the ingot radially toward the central axis of the ingot radially toward the central axis of the ingot which is at least about 30% the length of the radius of the ingot, and has a length as measured along the central axis of the ingot of at least about 20% the length of the constant diameter portion of the ingot, wherein silicon self-interstitials are the predominant intrinsic point defect in the axially symmetric region of the ingot;

slicing a segment of the constant diameter portion of the ingot comprising the axially symmetric region in a direction perpendicular to the central axis of the ingot to produce a single crystal silicon substrate having a central axis and a front side and a back side which are generally perpendicular to the axis of the substrate; and

depositing an epitaxial layer upon the front side of the substrate.

Claim 79. (new) The process of claim 78 further comprising controlling the cooling rate of the crystal from the solidification temperature to about 1100 °C to cause the formation of the axially symmetric region of the ingot having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3.

Claim 80. (new) The process of claim 78 wherein the width of the axially symmetric region is at least about 40% the length of the radius.

Claim 81. (new) The process of claim 78 wherein the width of the axially symmetric region is at least about 60% the length of the radius.

Claim 82. (new) The process of claim 78 wherein the width of the axially symmetric region is at least about 80% the length of the radius.

Claim 83. (new) The process of claim 78 wherein the width of the axially symmetric region is about equal to the length of the radius.

Claim 84. (new) A process for growing a single crystal silicon ingot, the single crystal silicon ingot having a central axis, a seed-cone, an end-cone, a constant diameter portion between the seed-cone and the end-cone having a circumferential edge, a radius extending from the central axis to the circumferential edge of the ingot, and a nominal diameter of 300 mm, having no detectable agglomerated intrinsic point defects at a detection limit of 10^3 defects/cm^3, the process comprising:

controlling a growth velocity, v, and an average axial temperature gradient, G_0, such that a ratio v/G_0 ranges in value from about 0.6 to about 1.5 times the critical value of v/G_0; and

controlling a cooling rate within a temperature range of about 1400 °C to about 800 °C, such that the rate ranges from about 0.1 °C/minute to about 1.5 °C/minute.

Claim 85. (new) The process of claim 84 wherein the growth velocity, v, and the average axial temperature gradient, G_0, are controlled such that the ratio v/G_0 ranges in value from about 0.75 to about 1 times the critical value of v/G_0.

Claim 86. (new) The process of claim 84 wherein the cooling rate is controlled within a temperature range of about 1400 °C to about 1000 °C.

Claim 87. (new) The process of claim 86 wherein the cooling rate is controlled such that the rate ranges from about 0.1 °C/minute to about 1 °C/minute.

Claim 88. (new) The process of claim 86 wherein the cooling rate is controlled such that the rate ranges from about 0.1 °C/minute to about 0.5 °C/minute.

Claim 89. (new) The process of claim 84 further comprising the step of annealing the substrate to dissolve oxygen precipitate nucleation centers formed during the growth of the single crystal silicon ingot.